CALIFORNIA HYDROGEN HIGHWAY NETWORK

Hydrogen Cars and Buses
Fact Sheet

There are a number of car technologies and fuels available that will help California meet its transportation and energy goals in the near term and, hydrogen is one fuel that can help California reach a sustainable transportation future in the long term. Hydrogen cars will help us reduce our dependence on petroleum, limit smog forming and greenhouse gas emissions, and provide economic benefits for our State.

Cars

All of the world's major auto manufacturers have well-established hydrogen vehicle research and development projects and California is the hub of most of these activities. According to the California Fuel Cell Partnership, since 2000, over 120 light-duty fuel cell cars have been placed in California, and have traveled more than 420,000 miles. Automakers are now placing hydrogen cars in real world applications primarily in public fleets, including the Air Resources Board, the California Energy Commission, the Department of General Services, the City of San Francisco and the City of Los Angeles. One manufacturer, Honda, is leasing a fuel cell car to a consumer.

There are two types of cars that can use hydrogen as a fuel, fuel cell vehicles (FCV) and hydrogen internal combustion engine (ICE) vehicles. A fuel cell car uses a fuel cell to provide electricity to an electric drive motor. Fuel cells are an electrochemical device that produces electricity efficiently, silently and without combustion. Hydrogen fuel is combined with oxygen (from air) to produce electrical energy. These vehicles are two times more efficient than their gasoline counterparts, therefore they can go at least twice as far on the energy equivalent of a gallon of gasoline.

With some modifications, vehicles with an internal combustion engine (ICE) can use hydrogen as a fuel. Hydrogen burns much cleaner than gasoline which makes hydrogen ICEs a possible near-term transition technology. However, hydrogen ICE vehicles still have some emissions, making fuel cells, with higher efficiencies and zero emissions, the long term goal.

Although manufacturers have made many advances in fuel cell technologies in the past few years, major milestones must still be achieved in order for fuel cells to compete with current vehicles on the market and provide maximum benefits to the State. These include:

- Prove the reliability and durability of the fuel cell
- Increase range by improving how hydrogen is stored on board the vehicle
- Reduce the cost of building fuel cell vehicles to be competitive with today's cars
- Development of infrastructure to support wide-scale vehicle introduction

Successes are happening in many of these areas. For instance, the new General Motors Equinox fuel cell vehicle has a range of 250 miles, which already meets the Department of Energy's 2010 range goal. As with any new technology, commercialization of hydrogen vehicles will take time and careful planning. Automakers predict this happening between 2015 and 2020.

Buses
Fuel cell buses also have an important role in California, and in the past few years, steady progress has been made in fuel cell transit bus applications. Three demonstrations that use hydrogen fuel cell powered buses are underway in California. One involves the Santa Clara Valley Transit Transportation Authority and San Mateo County Transit District, a second involves the Alameda/Contra Costa Transit District and Golden Gate Bridge Highway and Transportation District, and the third is conducted by Sunline Transit in the Coachella Valley. So far the buses are performing well, are providing service to many Californains and are well liked by the riders.

Conclusion
Significant progress has been demonstrated in California. There are many examples of fuel cell cars operating on the road. For instance fuel cell vehicles have traveled over half a million miles in California since 1990. Hydrogen is one part of a portfolio of strategies aimed at meeting our smog, climate change and energy diversity goals.

For More Information
If you would like to learn more about the hydrogen vehicles and buses as well as demonstration programs happening in California, please visit the California Hydrogen Highway web site at www.HydrogenHighway.ca.gov.